2017 Integrated Resource Plan

Public Utility Commission of Oregon Workshop

July 10, 2017




PACIFICORP

A BERKSHIRE HATHAWAY ENERGY COMPANY

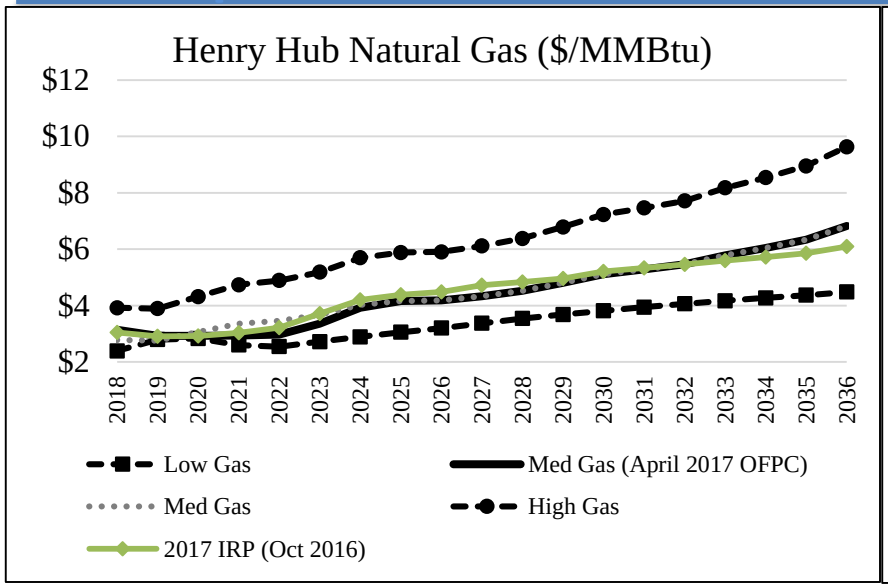
Energy Vision 2020 Regulatory Activities

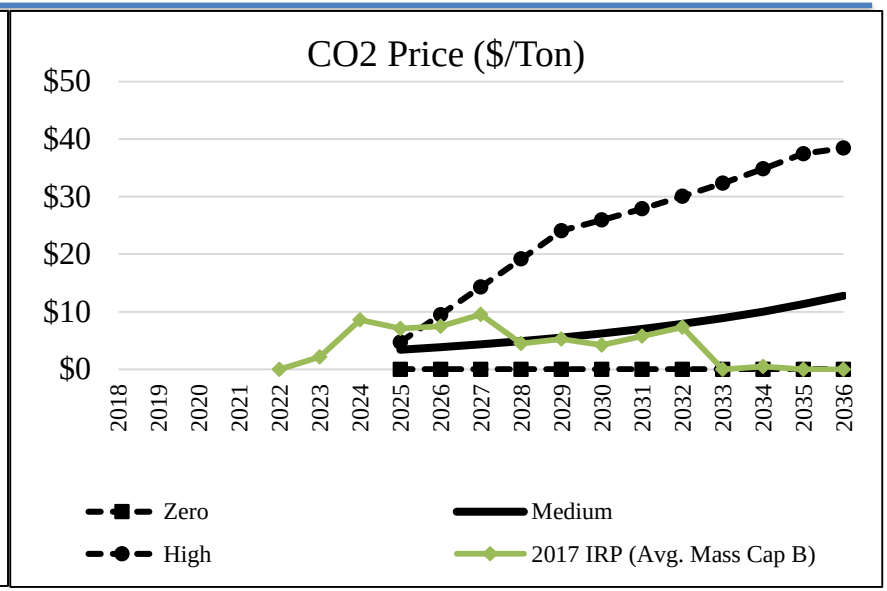
- Consistent with the 2017 IRP action plan, on June 30, 2017, separate applications were filed with the Wyoming, Utah, and Idaho commissions for (1) wind repowering, and (2) the Aeolus- to-Bridger/Anticline transmission and new Wyoming wind projects
- Collectively, the wind repowering and new transmission/wind projects are referred to as “Energy Vision 2020”
- The Aeolus-to-Bridger/Anticline transmission and new Wyoming wind projects require certificates for public convenience and necessity (CPCNs) from the Wyoming Public Service Commission
- Each application seeks to align the costs and benefits of the Energy Vision 2020 projects
- Oregon’s Renewable Adjustment Clause provides a path for potential recovery of the costs of the Energy Vision 2020 projects
- PacifiCorp also initiated the 2017R request for proposals (RFP) process, seeking competitive bids for new Wyoming wind projects, with the Oregon and Utah commissions

Energy Vision 2020 Updated Economic Analysis

- The applications filed with the Wyoming, Utah, and Idaho commissions include updated economic analysis for the Energy Vision 2020 projects
- The economic analysis uses the System Optimizer (SO) model and the Planning and Risk model (PaR) with updated assumptions
  - Updated forward price curve and environmental policy assumptions
  - Updated cost and performance assumptions for Energy Vision 2020 projects
- Wind repowering project scope expanded to include Goodnoe Hills (total scope expanded from approximately 905 MW in the preferred portfolio to approximately 999 MW in the updated analysis)
- New wind resource capacity totals 1,180 MW (comparable to the 1,100 MW in the preferred portfolio)—860 MW of proxy benchmark resources and 320 MW from qualifying facility projects located in the Aeolus area
- Present value revenue requirement differential (PVRR(d)) results calculated from the change in system costs through 2036 (IRP planning period) and through 2050 (capturing the full life of repowered and new wind resources)
- PacifiCorp will soon provide its updated economic analysis and associated work papers in its state IRP proceedings

Updated Forward Price Curve and Environmental Policy Assumptions





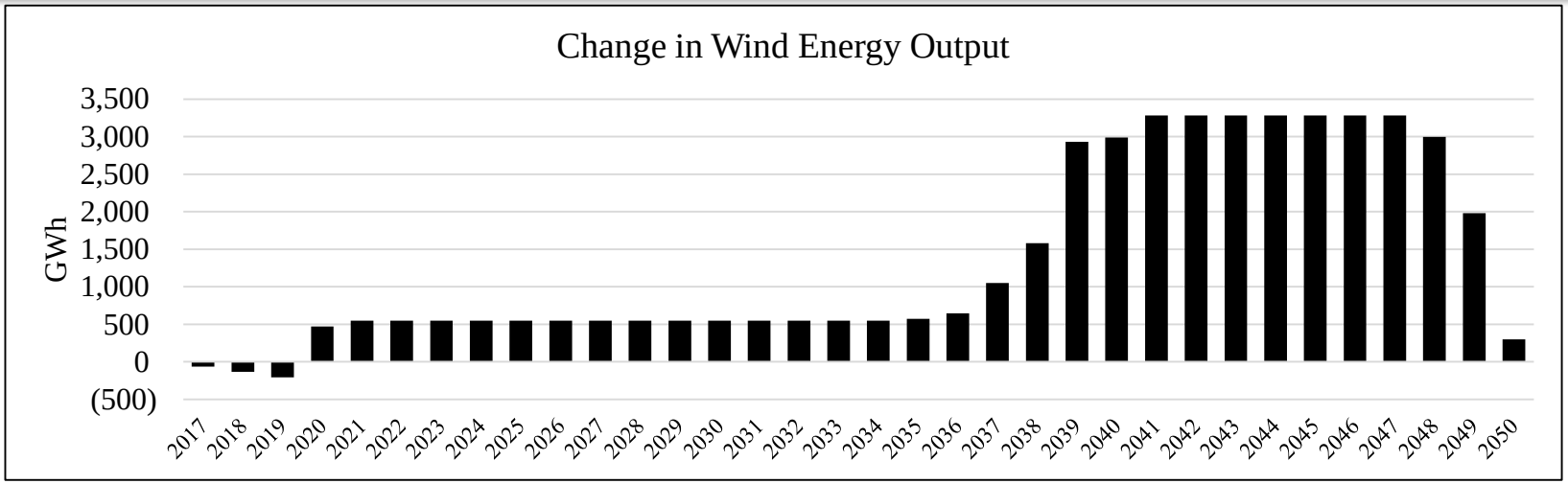
- Wholesale power prices, often set by natural gas prices, and CO_2 policy outcomes influence the forecast of net system benefits from the Energy Vision 2020 projects
- PacifiCorp's updated economic analysis considered range of different wholesale market price and CO_2 policy (price-policy) assumptions
- The Energy Vision 2020 projects were studied under nine different price-policy scenarios, reflecting different combinations of wholesale power prices and CO_2 prices

Wind Repowering Results ((Benefit)/Cost: 2036)

Price-Policy Scenario	SO Model PVRR(d)	PaR Stochastic-Mean PVRR(d)	PaR Risk-Adjusted PVRR(d)
Low Gas, Zero CO2	$33	$43	$44
Low Gas, Medium CO2	$0	$9	$8
Low Gas, High CO2	($18)	($17)	($19)
Medium Gas, Zero CO2	($33)	($24)	($25)
Medium Gas, Medium CO2	($22)	($13)	($15)
Medium Gas, High CO2	($41)	($35)	($36)
High Gas, Zero CO2	($75)	($40)	($43)
High Gas, Medium CO2	($64)	($34)	($37)
High Gas, High CO2	($103)	($80)	($85)

- Wind repowering reduces customer costs in seven out of nine price-policy scenarios (all but the lowest natural gas price scenarios when paired with either zero or medium CO_2 price assumptions)
- The results above do not include any benefits from renewable energy credits (RECs)—benefits would improve by approximately $4 million for every dollar assigned to the incremental RECs that will be generated from repowered wind

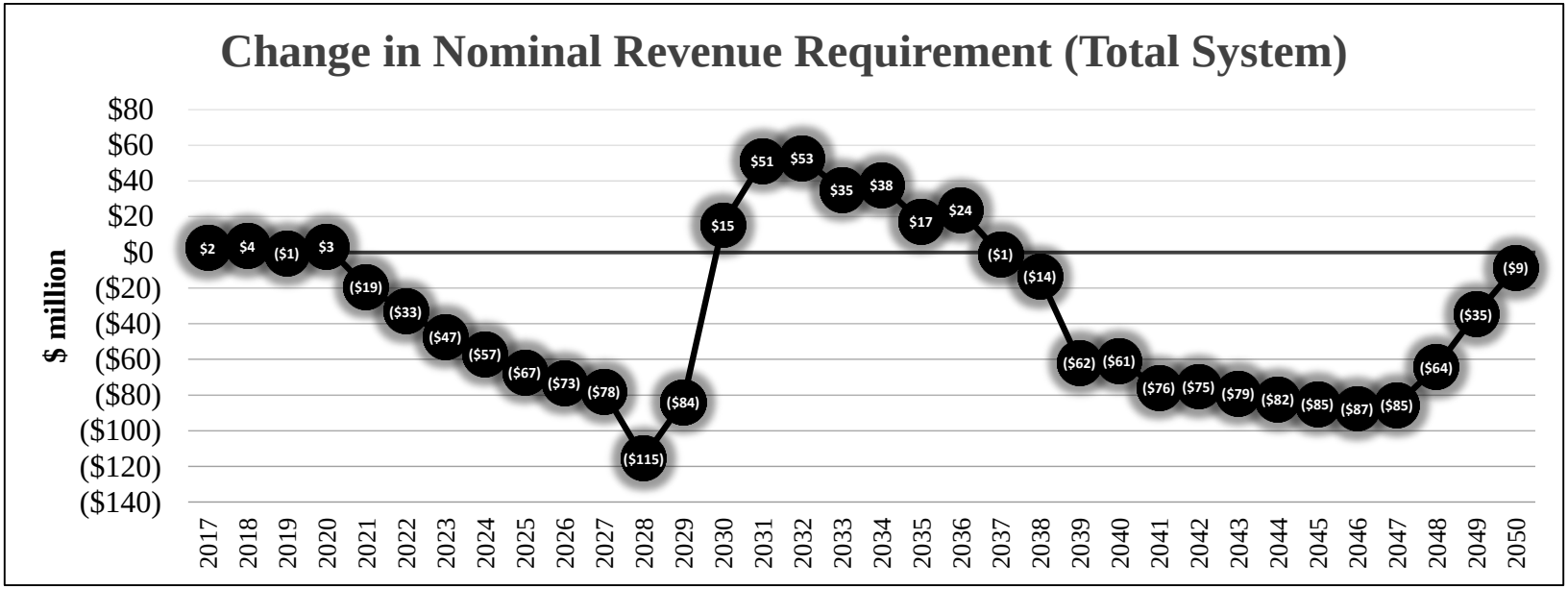
Wind Repowering Results ((Benefit)/Cost: 2050)



- When based on the change in system costs through 2050, the PVRR(d) results pick up the value of incremental wind generation beyond 2036, and all price-policy scenarios show customer benefits
- Benefits would improve by approximately $11 million for every dollar assigned to the incremental RECs that will be generated from repowered wind

Price-Policy Scenario	PaR Stochastic-Mean PVRR(d)
Low Gas, Zero CO2	($41)
Low Gas, Medium CO2	($245)
Low Gas, High CO2	($344)
Medium Gas, Zero CO2	($362)
Medium Gas, Medium CO2	($359)
Medium Gas, High CO2	($401)
High Gas, Zero CO2	($400)
High Gas, Medium CO2	($274)
High Gas, High CO2	($589)

Wind Repowering Results (Change in Nominal Revenue Requirement)



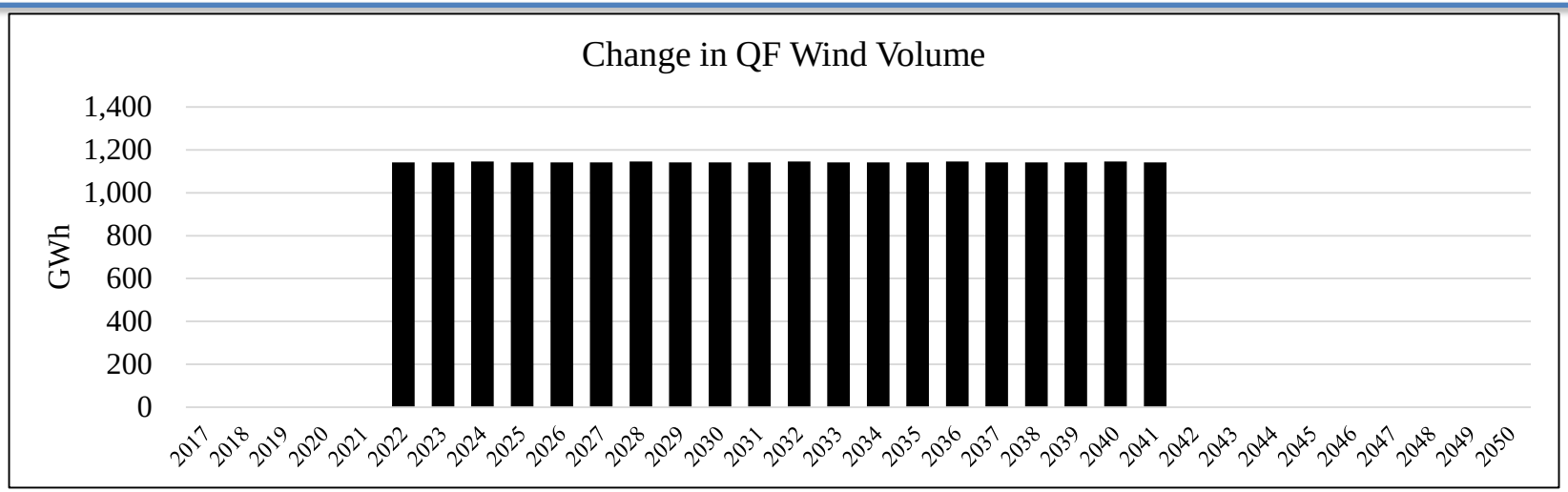
- The above figure shows the change in nominal revenue requirement for the medium natural gas price and medium CO_2 price scenario
- The figure reflects project costs including capital revenue requirement (*i.e.*, depreciation, return, income taxes and property taxes), operations and maintenance (O&M) expenses, Wyoming wind-production taxes, and federal production tax credits (PTCs)
- Project costs are netted against the system impacts from wind repowering, reflecting the change in net power costs (NPC), emissions, non-NPC variable costs, and system fixed costs that are affected by, but not directly associated with, wind repowering

New Transmission and Wind Results ((Benefit)/Cost: 2036)

Price-Policy Scenario	SO Model PVRR(d)	PaR Stochastic-Mean PVRR(d)	PaR Risk-Adjusted PVRR(d)
Low Gas, Zero CO2	$121	$77	$74
Low Gas, Medium CO2	$73	$32	$26
Low Gas, High CO2	($84)	($133)	($147)
Medium Gas, Zero CO2	($19)	($57)	($66)
Medium Gas, Medium CO2	($85)	($111)	($124)
Medium Gas, High CO2	($156)	($224)	($242)
High Gas, Zero CO2	($304)	($260)	($280)
High Gas, Medium CO2	($318)	($272)	($293)
High Gas, High CO2	($396)	($409)	($437)

- The Aeolus-to-Bridger/Anticline transmission and new Wyoming wind projects reduce customer costs in seven out of nine price-policy scenarios (all but the lowest natural gas price scenarios when paired with either zero or medium CO_2 price assumptions)
- The results above do not include any benefits from RECs—benefits would improve by approximately $26 million for every dollar assigned to the incremental RECs that will be generated from new wind

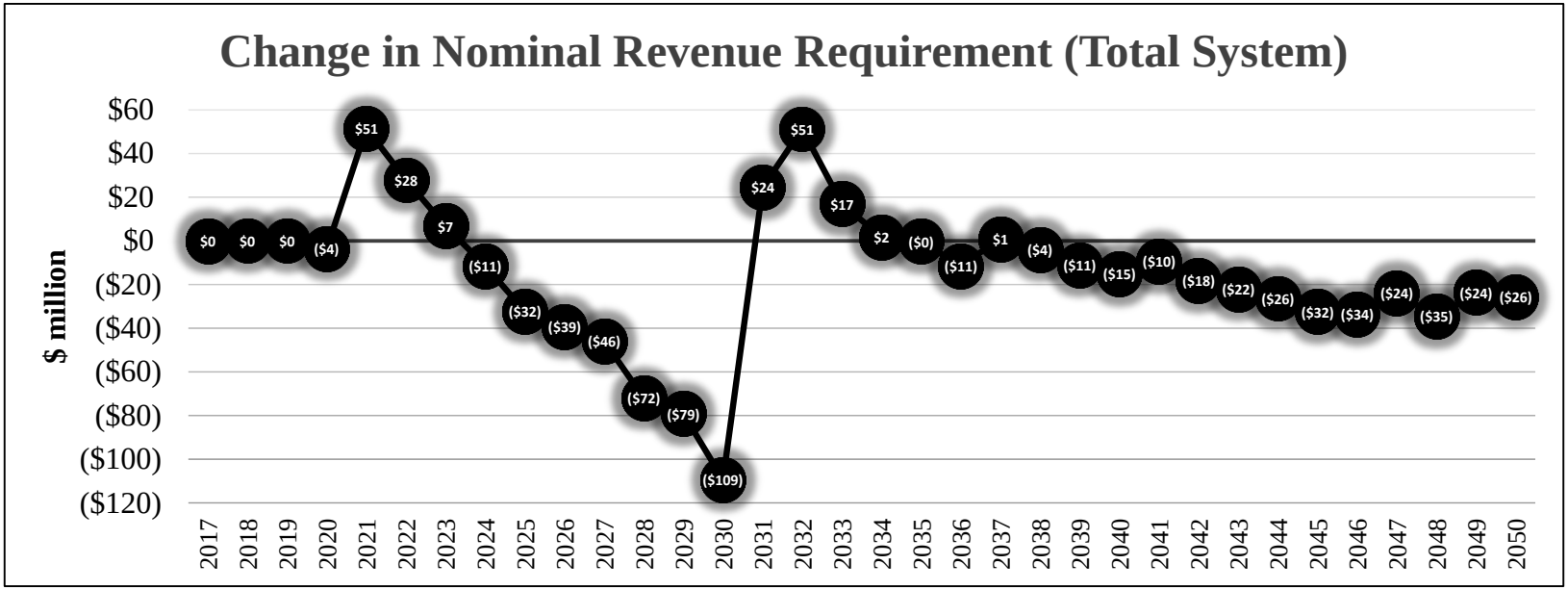
Transmission and New Wind Results ((Benefit)/Cost: 2050)



- When based on the change in system costs through 2050, the PVRR(d) results do not capture likely benefits of additional wind energy that could be added beyond the term of the QF contracts
- Benefits would improve by approximately $34 million for every dollar assigned to the incremental RECs that will be generated from new wind

Price-Policy Scenario	PaR Stochastic-Mean PVRR(d)
Low Gas, Zero CO2	$174
Low Gas, Medium CO2	$93
Low Gas, High CO2	($194)
Medium Gas, Zero CO2	($53)
Medium Gas, Medium CO2	($137)
Medium Gas, High CO2	($317)
High Gas, Zero CO2	($341)
High Gas, Medium CO2	($351)
High Gas, High CO2	($595)

New Transmission and Wind Results (Change in Nominal Revenue Requirement)



- The above figure shows the change in nominal revenue requirement for the medium natural gas price and medium CO_2 price scenario
- The figure reflects project costs including capital revenue requirement (*i.e.*, depreciation, return, income taxes and property taxes) net of transmission revenue credits, O&M expenses, Wyoming wind-production taxes, and federal production tax credits (PTCs)
- Project costs are netted against the system impacts from wind repowering, reflecting the change in net power costs (NPC), emissions, non-NPC variable costs, and system fixed costs that are affected by, but not directly associated with, the new transmission and wind

Additional Discussion Items

- Coal plant economics and alternatives
- Environmental Protection Agency litigation
- Energy efficiency and demand response
- Other?